

Macaque Attack: Variation in craniofacial and TMJ shape in *Macaca fascicularis*

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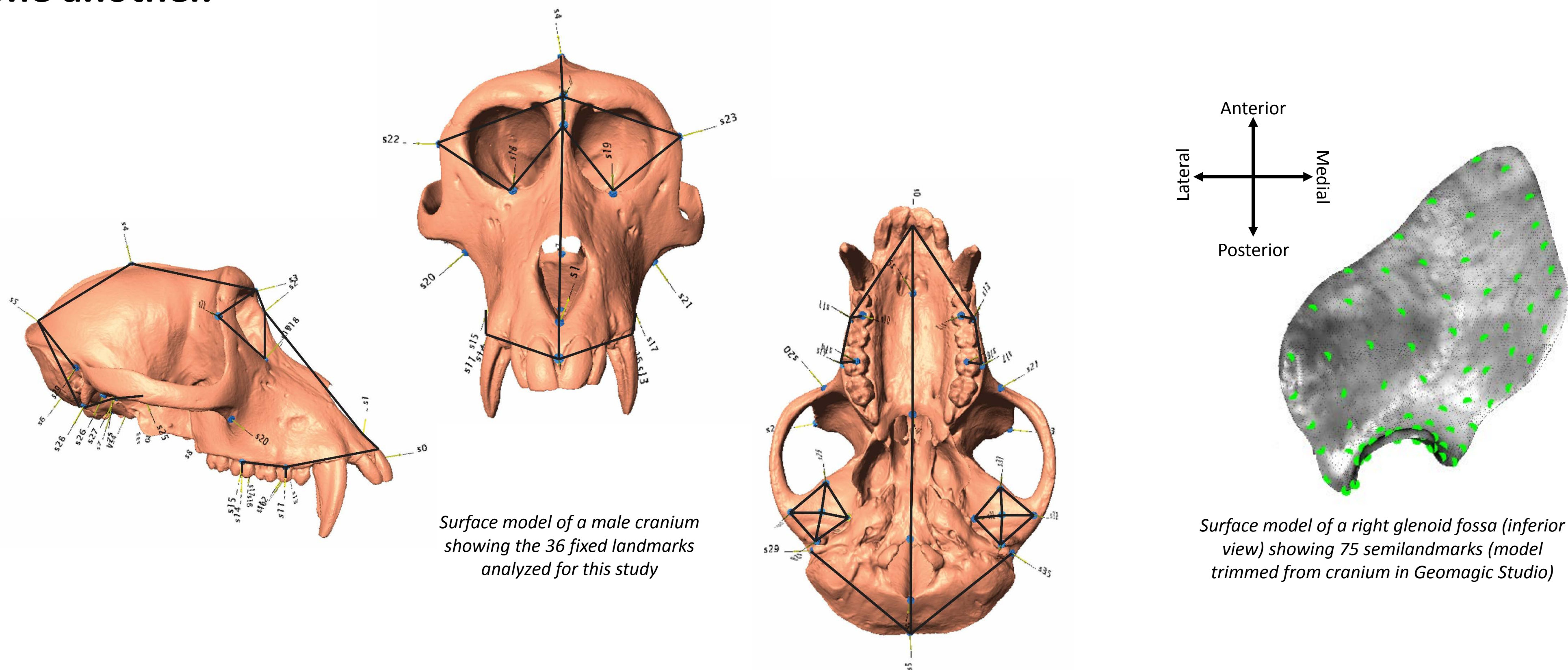
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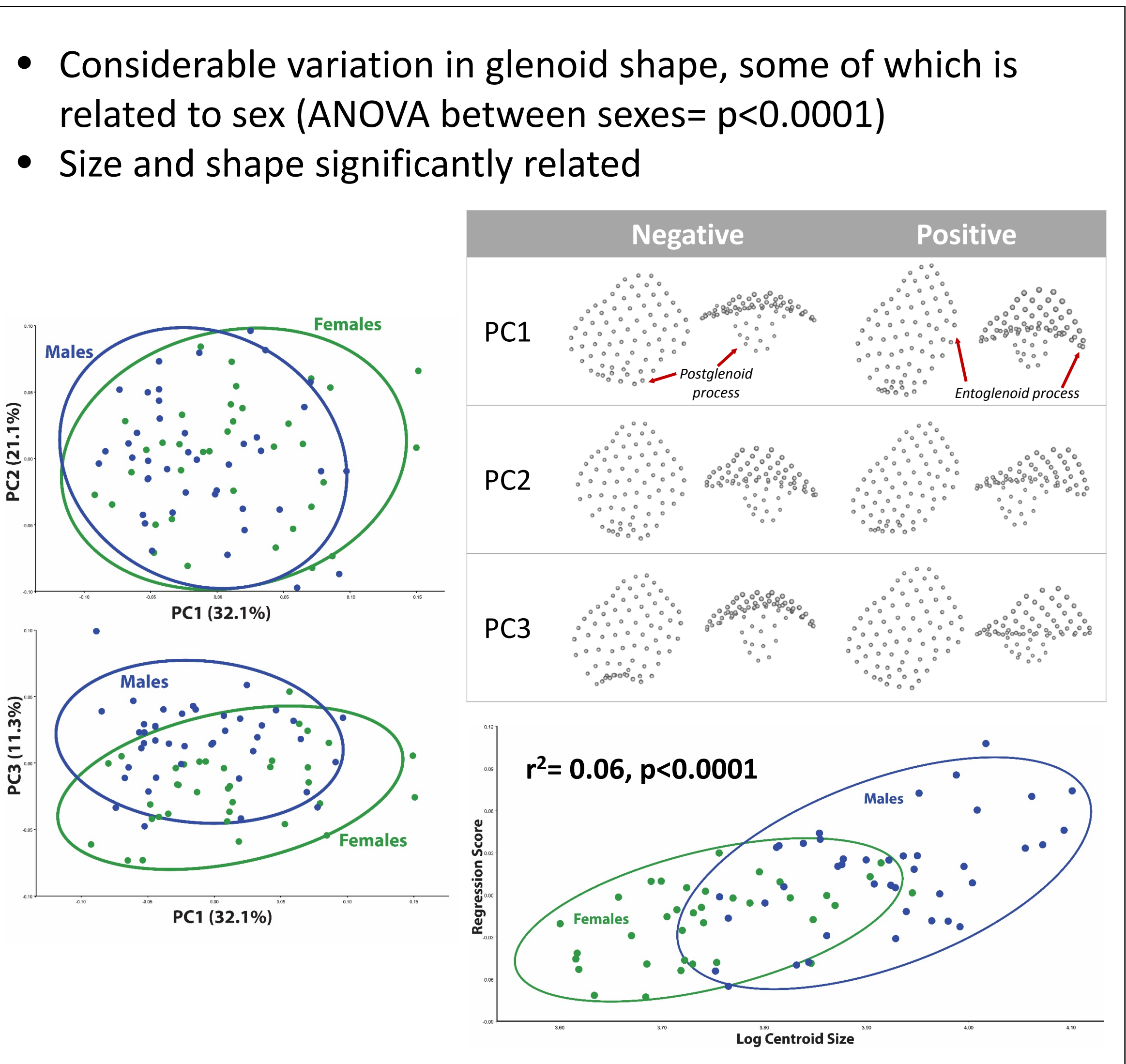
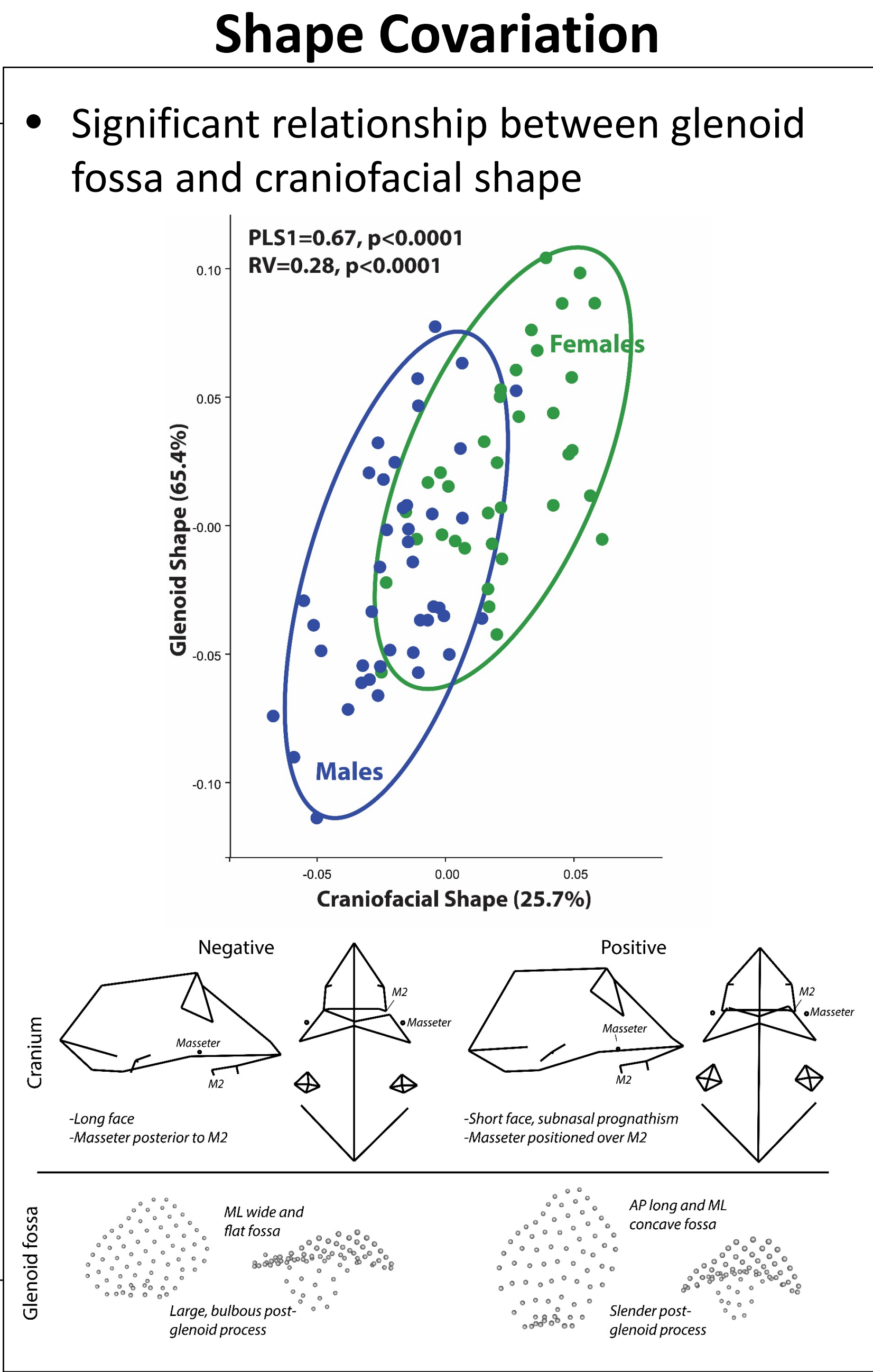
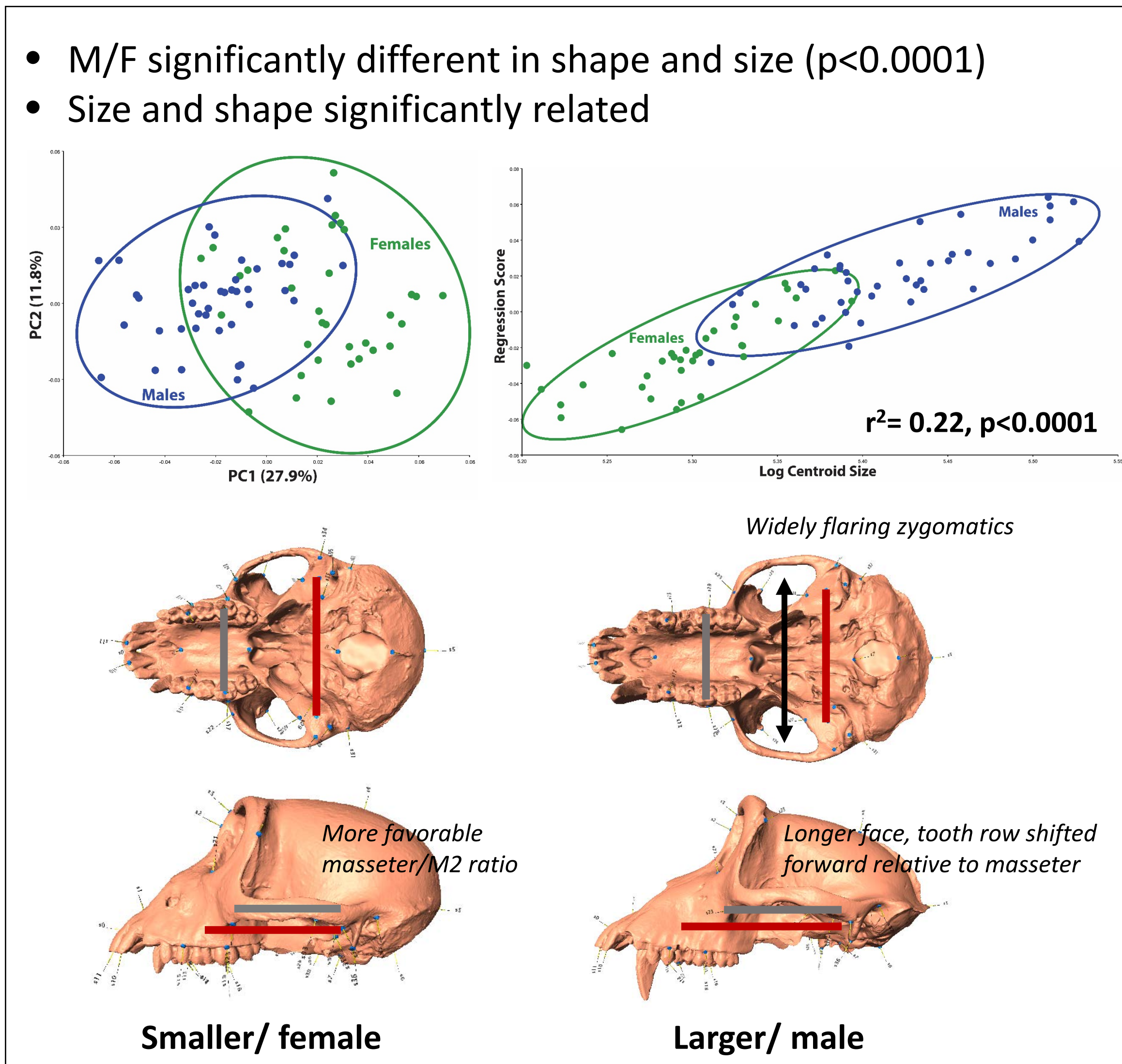
INTRODUCTION: Though intraspecific variation in craniofacial and masticatory morphology can be considerable, most functional analyses focus on examining variation across species, and many focus in just a single region of the masticatory apparatus rather than examining it more holistically. **Here we analyze craniofacial and temporomandibular joint (TMJ) morphology in a large sample of the crab-eating macaque, *Macaca fascicularis*, with the goal of characterizing variation in this species and evaluating shape variation in relation to sex and cranial size. We further examine how aspects of craniofacial and TMJ shape covary with one another.**

MATERIALS AND METHODS:

- 78 *M. fascicularis* crania (female= 36, male= 42)
- 3D models generated using an HDI 120 blue LED scanner
- Geometric morphometric analyses describing overall craniofacial and glenoid fossa shape
- Analyses conducted (for each dataset) included:
 - PCA to examine patterns in shape variation
 - Multivariate regression of shape on log centroid size
 - Procrustes ANOVA to examine differences in shape and size relative to sex
- Two-block partial least squares (2BPLS) analysis to examine covariation between craniofacial and glenoid fossa shape



RESULTS:



DISCUSSION: We observed variation in craniofacial and glenoid fossa shape in relation to both size and sex. Differences in craniofacial morphology between sexes are consistent with results of previous analyses describing *M. fascicularis* cranial shape variation (e.g., Ravosa, 1991; Richtsmeier et al., 1993; Terhune et al., 2015; Yao, 2016) and suggest that males, with their long faces, have reduced masticatory leverage for postcanine biting. Glenoid fossa shape varies considerably among individuals, with aspects of ML width, AP length, concavity, and postglenoid process size being especially variable. We also found a significant relationship between craniofacial and glenoid fossa shape, suggesting these two sets of morphologies covary considerably within *M. fascicularis*. In particular, individuals with longer faces and more posteriorly positioned masseters relative to the tooth row have wider glenoids with a raised bar-like articular eminence, while individuals with shorter faces and more favorable masseter leverage have AP long and ML concave glenoids. Future analyses will focus on assessing the potential biomechanical significance of this variation, and examining relationships between this variation and dental morphology, wear, and craniofacial/dental pathologies.

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